SOME OBSERVATIONS ON DENSITY CURRENTS IN THE LABORATORY AND IN THE FIELD

BATA GEZA
and
KNEZEVICH BOGICH
Hydrotechnical Institute
SERBIAN ACADEMY OF SCIENCES
BEOGRAD YUGOSLAVIA

ABSTRACT
~~SYNOPSIS~~

In the experimental part of this study, we examined the influence of the variation in the viscosity of the superposed stratum on the resistance of the underlying, heavy ~~one~~, as well as the relation between the resistances and velocity distributions in both strata. In the section on laminar flow it was shown that the resistances vary within the limits $\frac{196}{Re} < \lambda < \frac{236}{Re}$ at the tenfold difference of the viscosity of the upper liquid. Then there have been given the equations for determining the thickness of the "entrained" layer, but the phenomenon of disturbance at the contact of the entrained and retrograde layer of the superposed stratum has only been described. It was shown in the turbulent flow, that we came to the same result, whether the resistance coefficient λ is obtained from the velocity-diagram-area or from the diagram $\lambda = f(Re)$. The resistance coefficient at the interface amounts $\lambda_i = 0,o1o - 0,o2o$.

The investigations in the field, as ~~exposed~~ in this paper, have shown, that several factors considerably complicate the application of the laboratory results, obtained so far, in analysing the motion of density currents in reservoirs. These factors are as follows : gradual decrease in the concentration of the underflow, nonuniform turbidity distribution in the verticals, determination of the volume of the captured ballast liquid, unsteady waves, and temperature effects.

~~With the possibility of reducing the gravity to a desirable value, there has been opened a new prospect of the experimental hydraulics, which could take the name of Archimedes.~~

CONCLUSION

Density currents with unvariable density ~~while~~ travelling along the bottom of the lake, can, on the basis of the recent experiments, be subjected to ~~the~~ hydraulic calculation, because the approximate values of coefficients appearing in the equations, have been found ~~out~~. It is necessary that ~~the~~ further investigations cover the higher values of Reynolds numbers, and that in turbulent flow ~~we should~~ investigate the closer relationship between the resistance coefficient λ_i on the interface and the viscosity, ~~of~~ this relationship ~~being~~ covered in this paper only within limits of $\lambda_i = 0,010$ to $0,020$. Further detailing of experimental values can be obtained by examining the friction effect on the interface, ~~bearing upon~~ the velocity distribution in the lower stratum and by finding the thickness of the superposed stratum not entering into the equations as a parameter, both of which ~~has~~ been not fully elaborated in this paper. It seems, however, that even ~~when~~ all this were detailed, the estimations of uniform and gradually varied flows of density currents would be applied only to simplified observation of their behavior. On the field the phenomena are considerably more complicated. But, through the systematic investigation of decrease in concentration of density currents along their flow, through the investigation of the temperature effects and then, by the careful determination of variations in volume of captured water and by the closer examination of surge-waves propagation conditions, we can come to better and more precise methods of their calculation.

Therefore, the investigation of density currents will continue to be an important and interesting field for ~~the~~ hydraulic research work.

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Approved For Release 2009/09/08 : CIA-RDP83-00423R000800150005-2